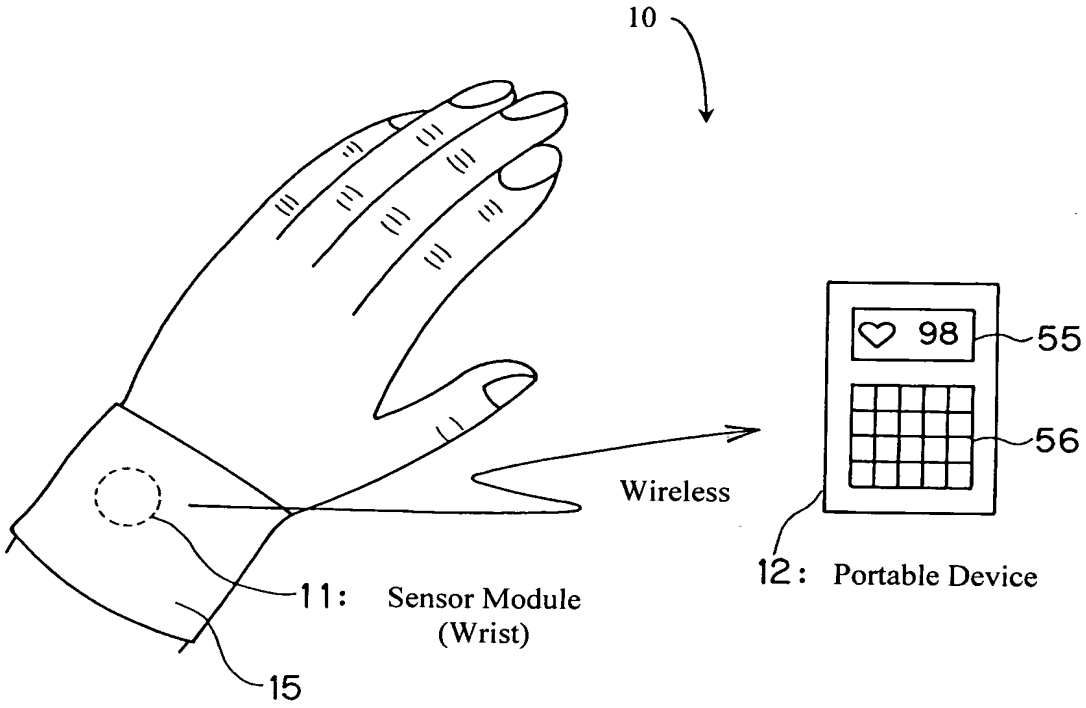
10
98
55
56
Wireless
11: Sensor Module
(Wrist)
12: Portable Device
15

Fig. 1

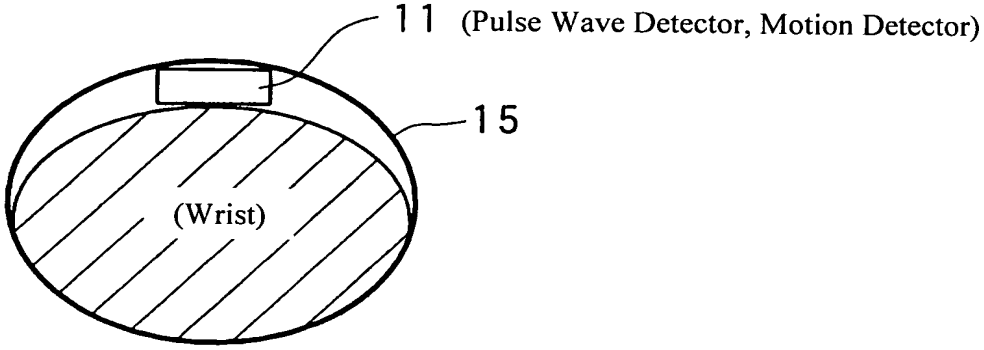

Fig. 2

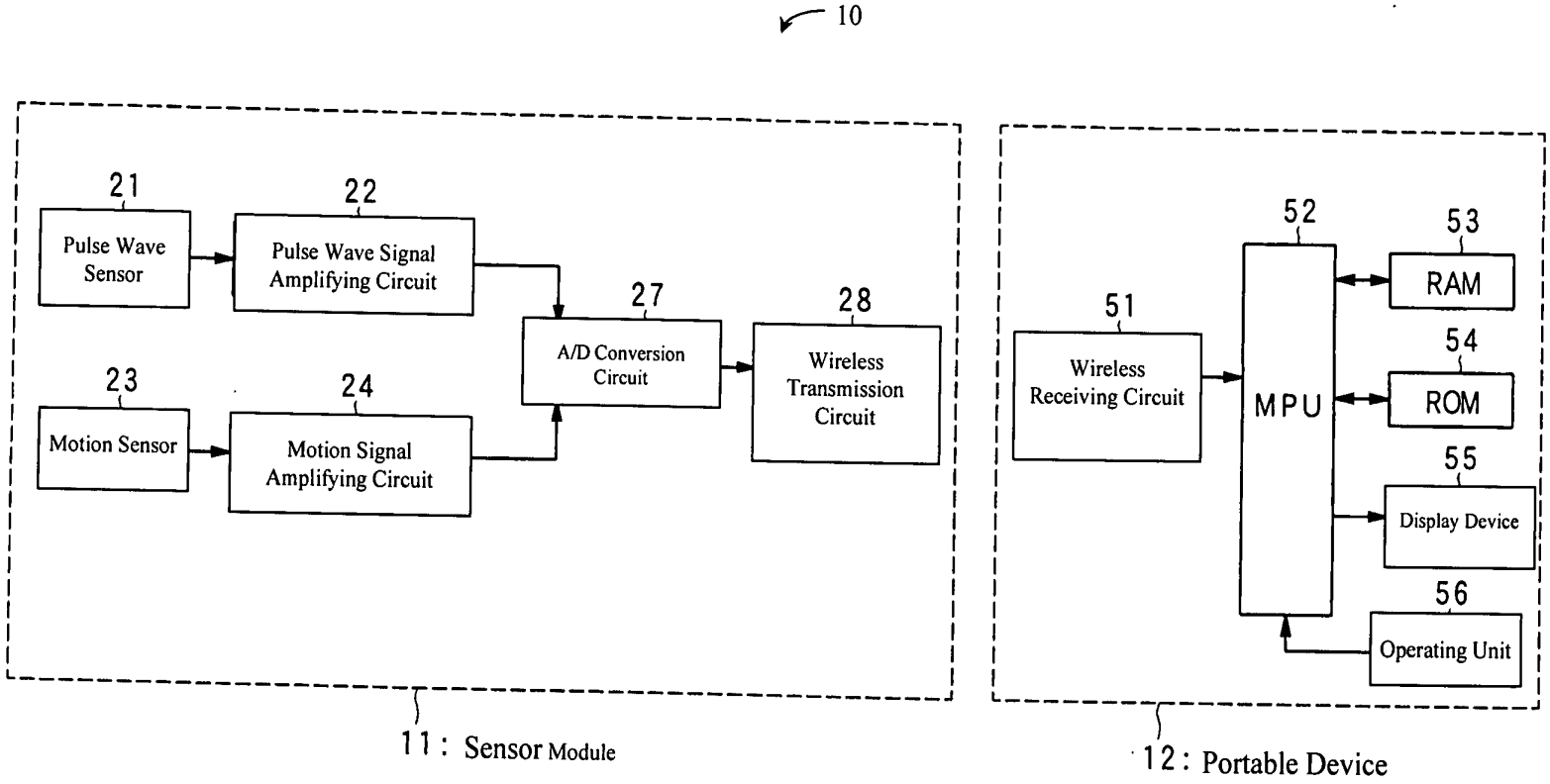
10
21
Pulse Wave Sensor
22
Pulse Wave Signal Amplifying Circuit
27
A/D Conversion Circuit
28
Wireless Transmission Circuit
23
Motion Sensor
24
Motion Signal Amplifying Circuit
11 : Sensor Module
51
Wireless Receiving Circuit
52
MPU
53
RAM
54
ROM
55
Display Device
56
Operating Unit
12 : Portable Device

Fig. 3

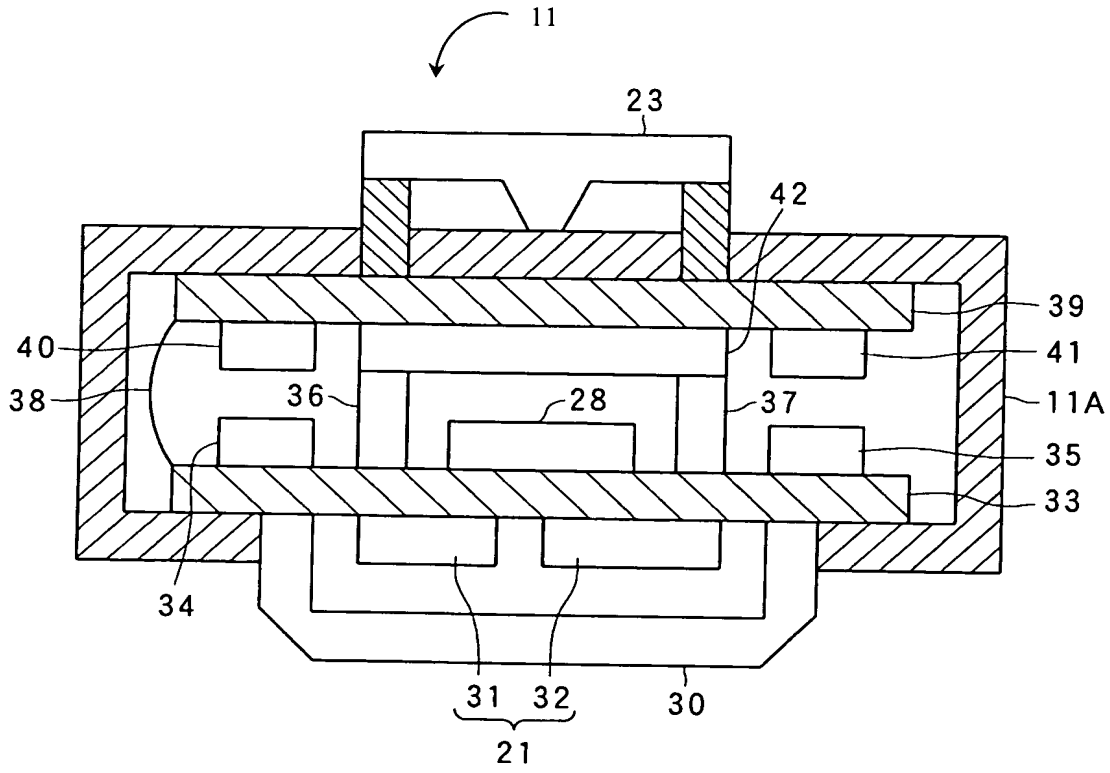

Fig. 4

Reduction Results

Pulse + Motion n3(Pulse Wave Sensor Output)

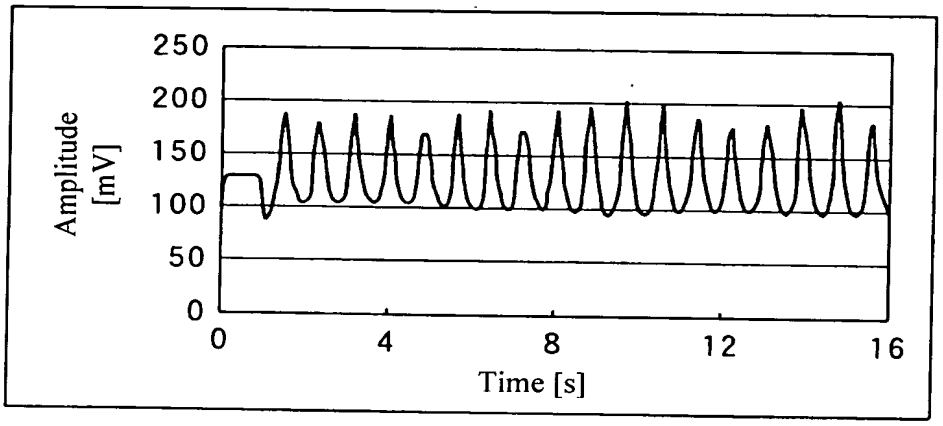

Fig. 5

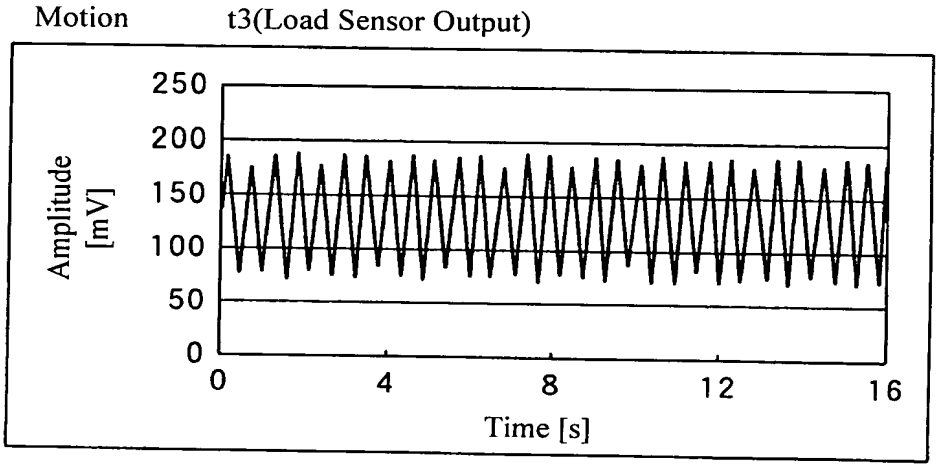
Motion
t3(Load Sensor Output)
Amplitude [mV]
250
200
150
100
50
0
0
4
8
12
16
Time [s]

Fig. 6

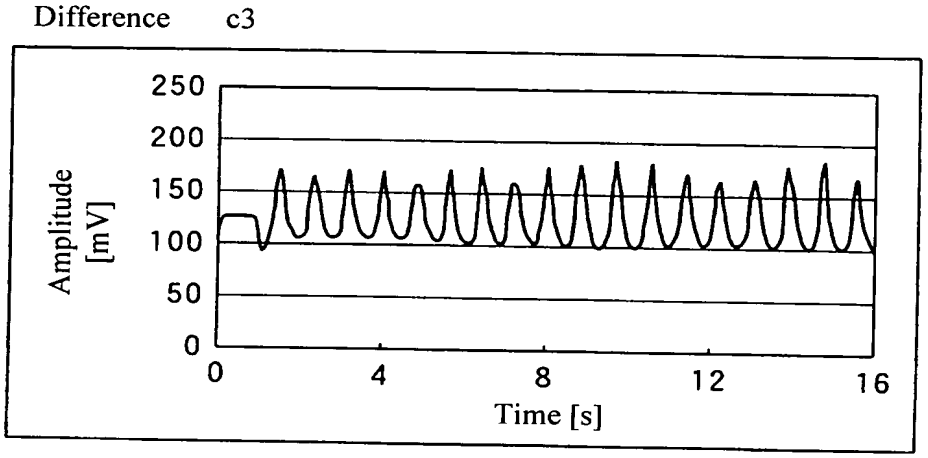
Difference c3
250
200
150
100
50
0
Amplitude [mV]
0
4
8
12
16
Time [s]

Fig. 7

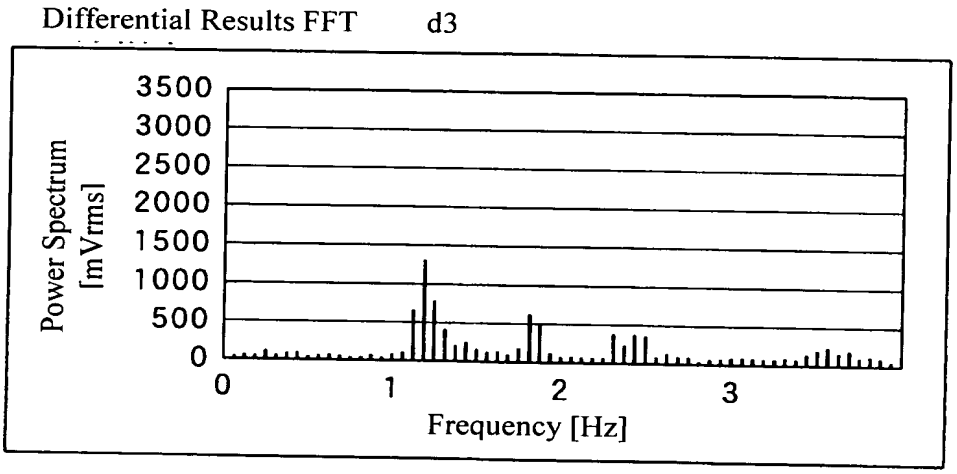
Differential Results FFT d3
Power Spectrum [mVrms]
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
Frequency [Hz]

Fig. 8

Hand Clenching and Unclenching

FFT Reduction

Pulse + Motion n3(Pulse Wave Sensor Output FFT Results)

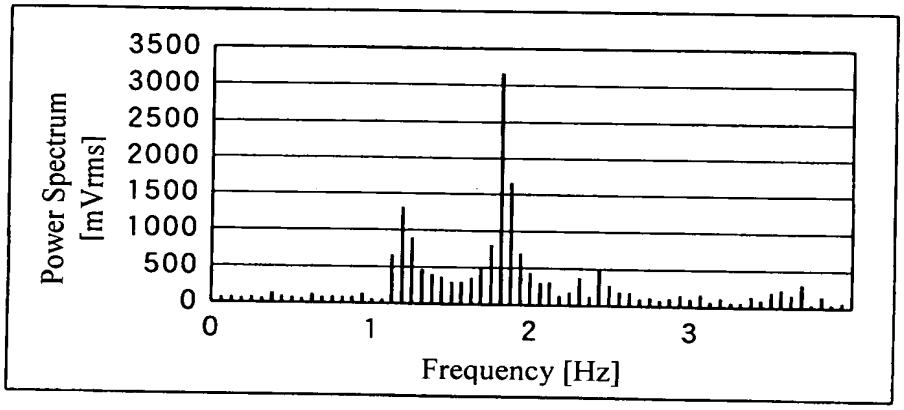

Fig. 9

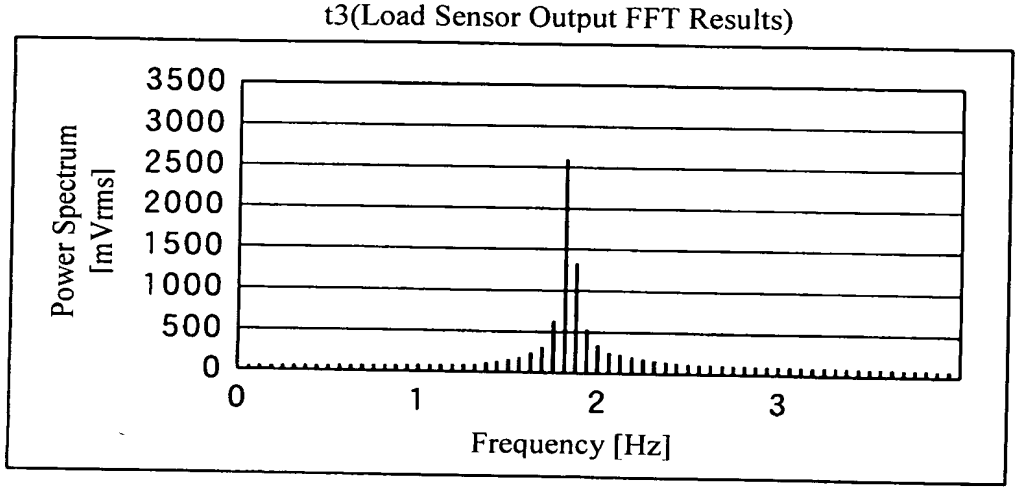
t3(Load Sensor Output FFT Results)
Power Spectrum [mVrms]
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
Frequency [Hz]

Fig. 10

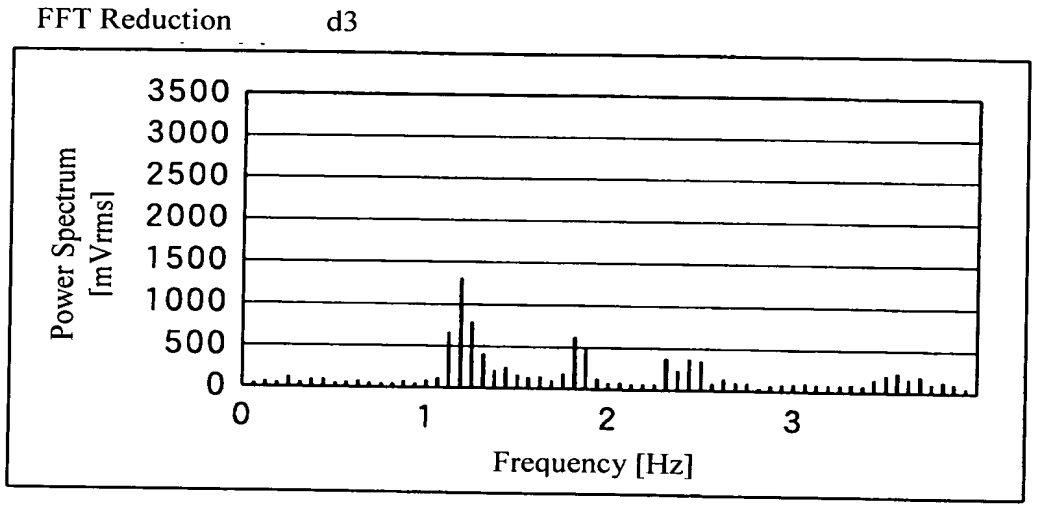
FFT Reduction
d3
Power Spectrum [mVrms]
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
Frequency [Hz]

Fig. 11

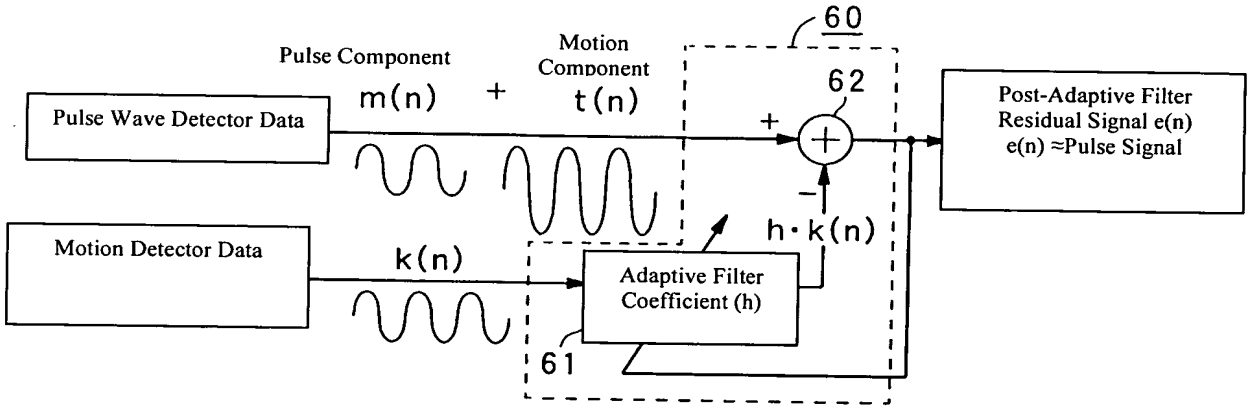
60
Pulse Component
Motion
Component
m(n)
+
t(n)
62
Pulse Wave Detector Data
+
Post-Adaptive Filter
Residual Signal e(n)
e(n) ≈Pulse Signal
−
h·k(n)
Motion Detector Data
k(n)
Adaptive Filter
Coefficient (h)
61

Fig. 12

Adaptive Filter

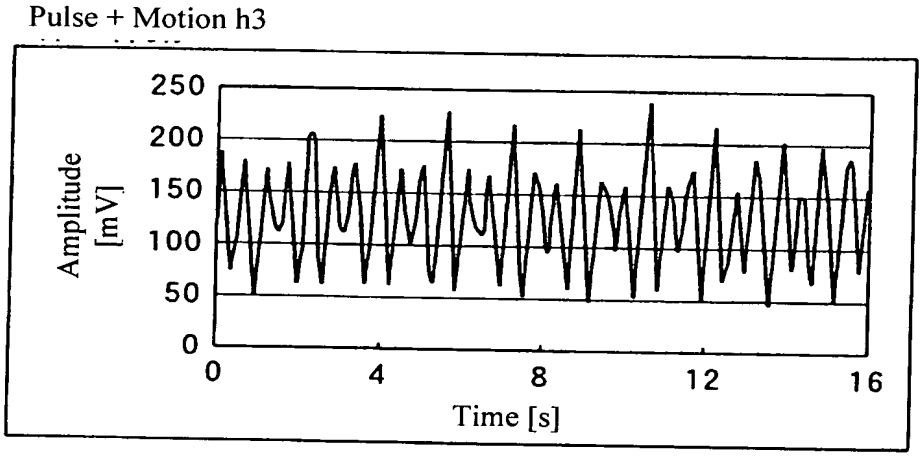

Fig. 13

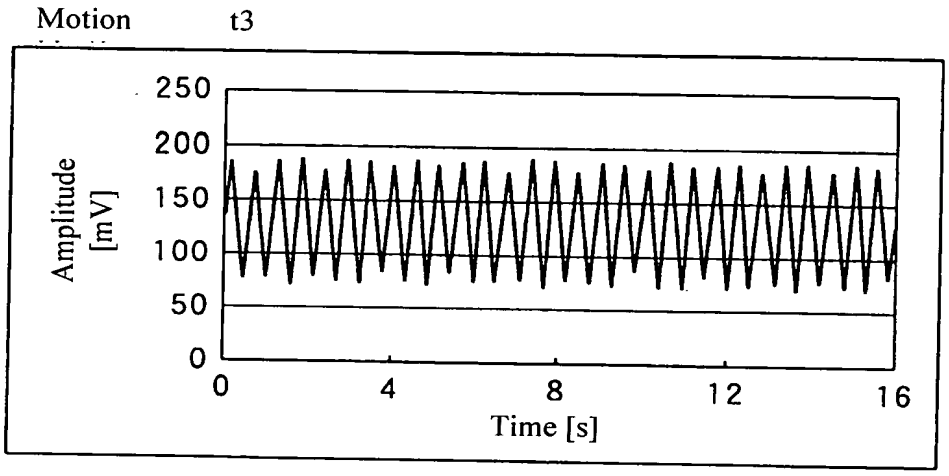

Fig. 14

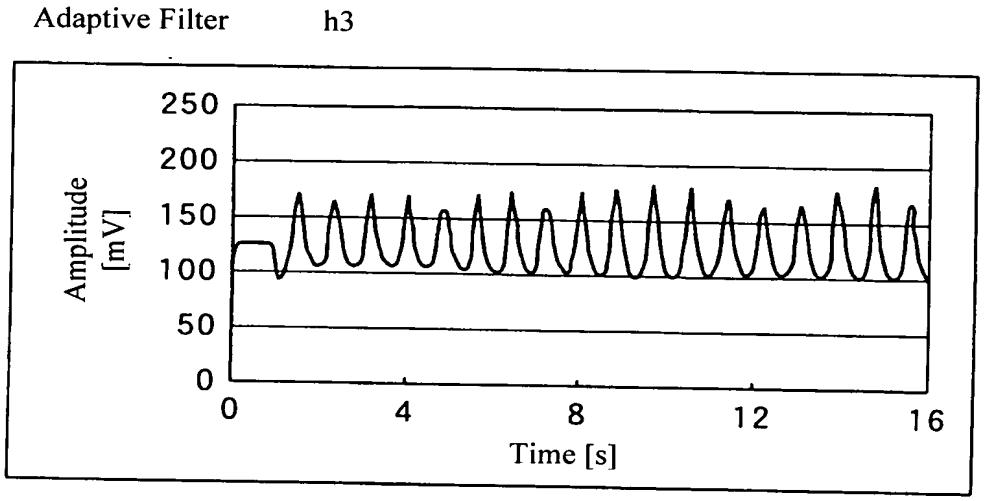
Adaptive Filter h3
Amplitude [mV]
250
200
150
100
50
0
0
4
8
12
16
Time [s]

Fig. 15

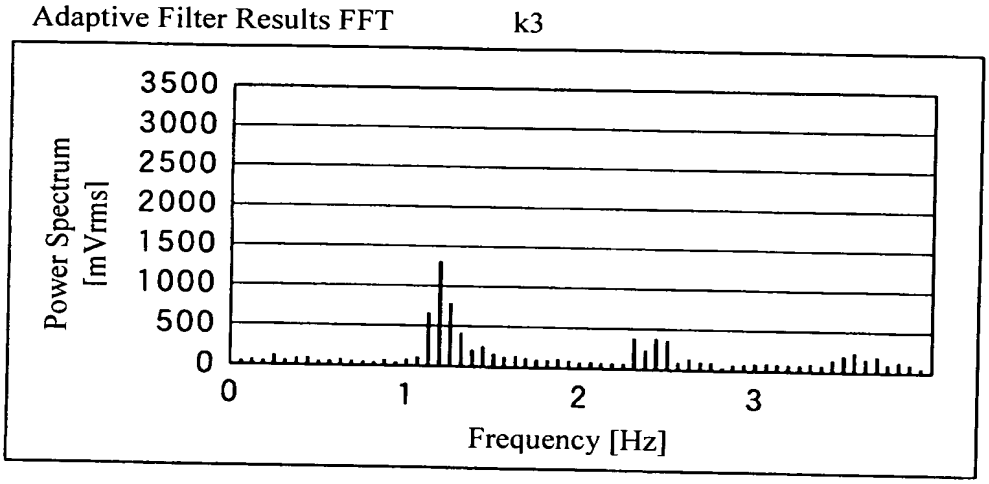
Adaptive Filter Results FFT
k3
Power Spectrum [mVrms]
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
Frequency [Hz]

Fig. 16

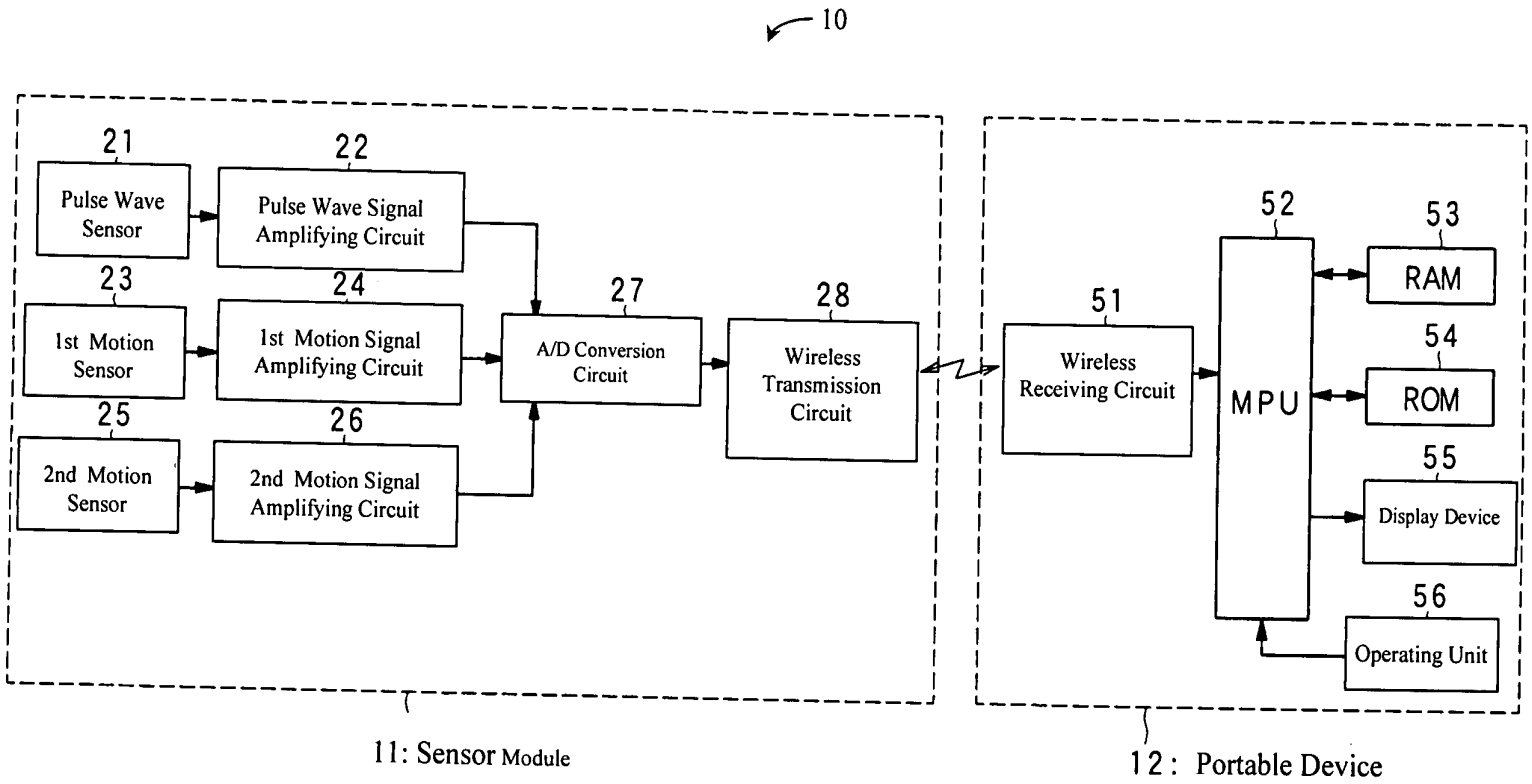
10
21
Pulse Wave Sensor
22
Pulse Wave Signal Amplifying Circuit
23
1st Motion Sensor
24
1st Motion Signal Amplifying Circuit
25
2nd Motion Sensor
26
2nd Motion Signal Amplifying Circuit
27
A/D Conversion Circuit
28
Wireless Transmission Circuit
11: Sensor Module
51
Wireless Receiving Circuit
52
MPU
53
RAM
54
ROM
55
Display Device
56
Operating Unit
12: Portable Device

Fig. 17

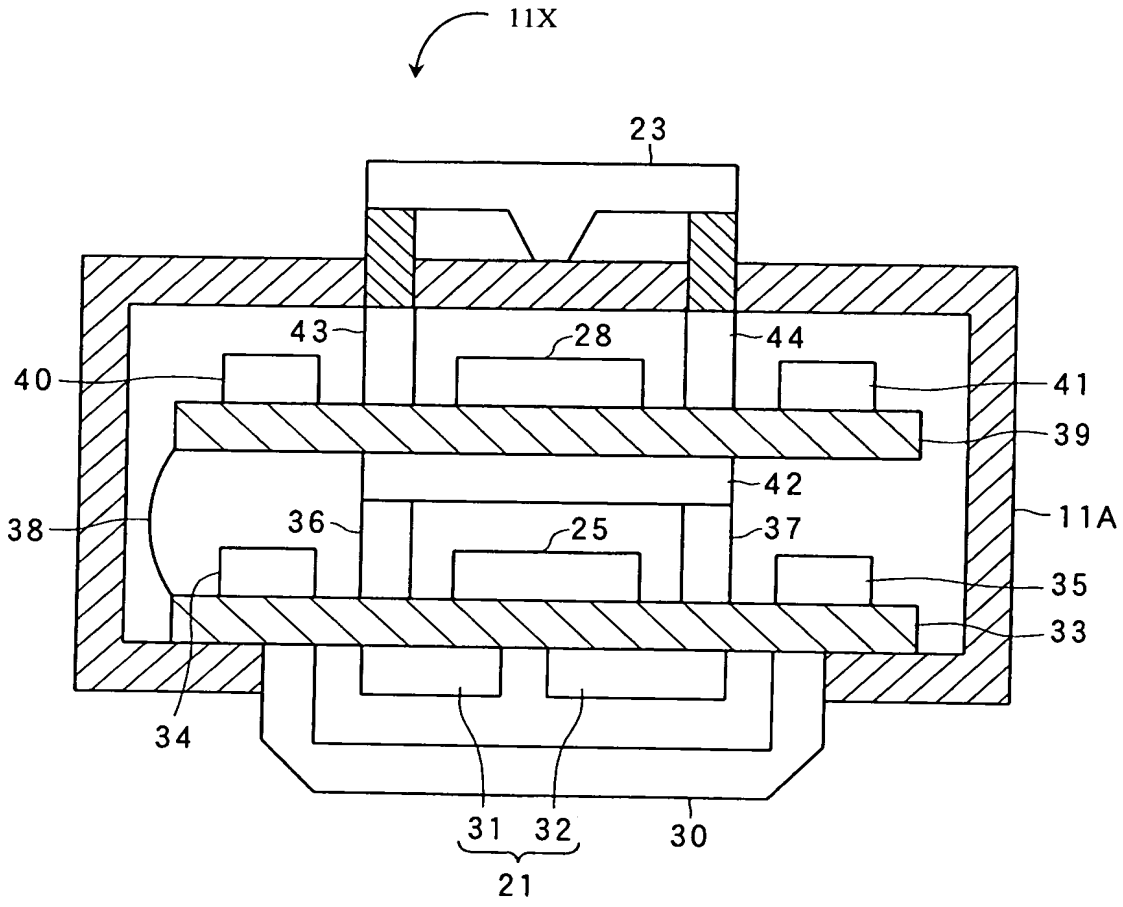

Fig. 18

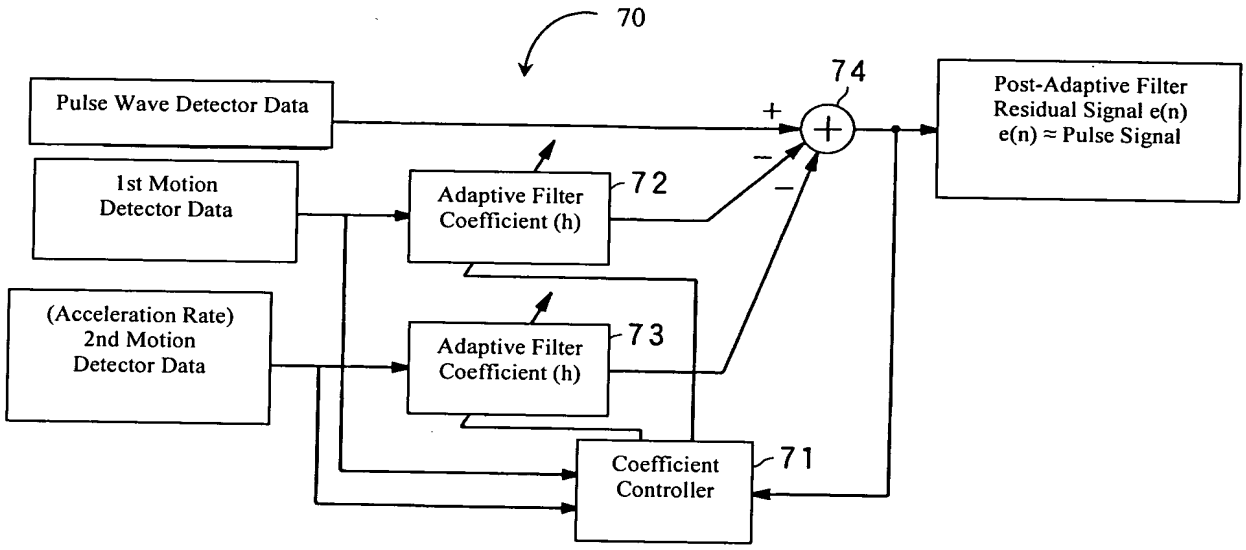
70
74
Pulse Wave Detector Data
1st Motion
Detector Data
Adaptive Filter
Coefficient (h)
72
(Acceleration Rate)
2nd Motion
Detector Data
Adaptive Filter
Coefficient (h)
73
Coefficient
Controller
71
+
−
−
Post-Adaptive Filter
Residual Signal e(n)
e(n) ≈ Pulse Signal

Fig. 19

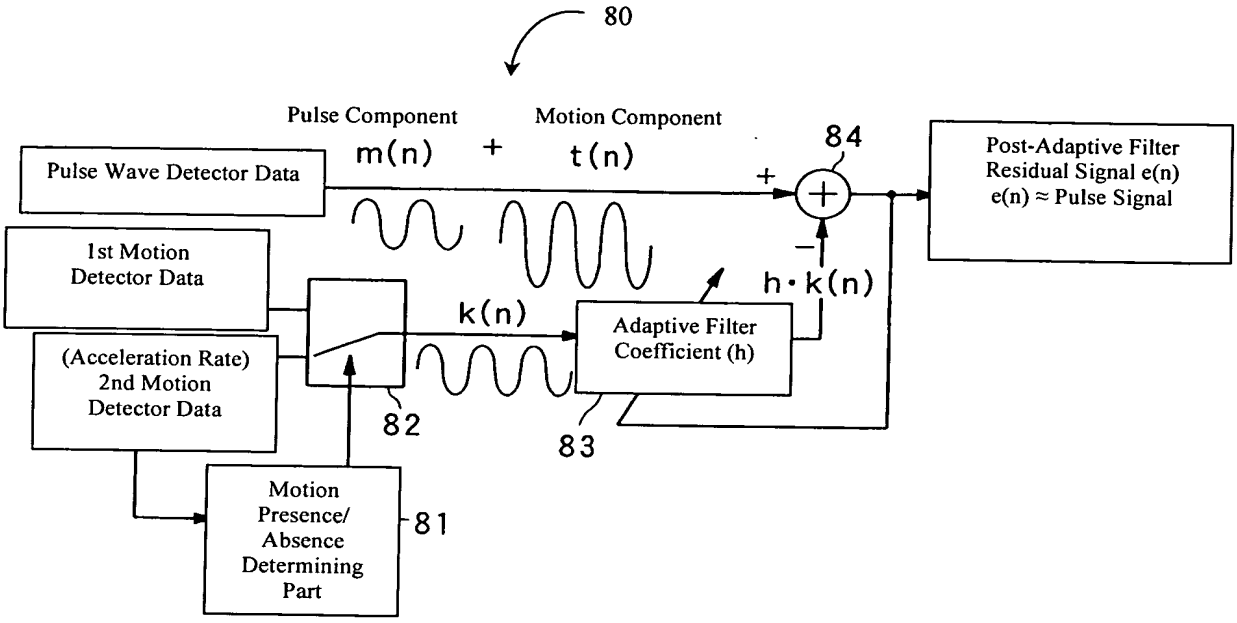
80
Pulse Component
Motion Component
m(n) + t(n)
Pulse Wave Detector Data
84
+
+
−
Post-Adaptive Filter
Residual Signal e(n)
e(n) ≈ Pulse Signal
1st Motion
Detector Data
h·k(n)
k(n)
Adaptive Filter
Coefficient (h)
(Acceleration Rate)
2nd Motion
Detector Data
82
83
Motion
Presence/
Absence
Determining
Part
81

Fig. 20

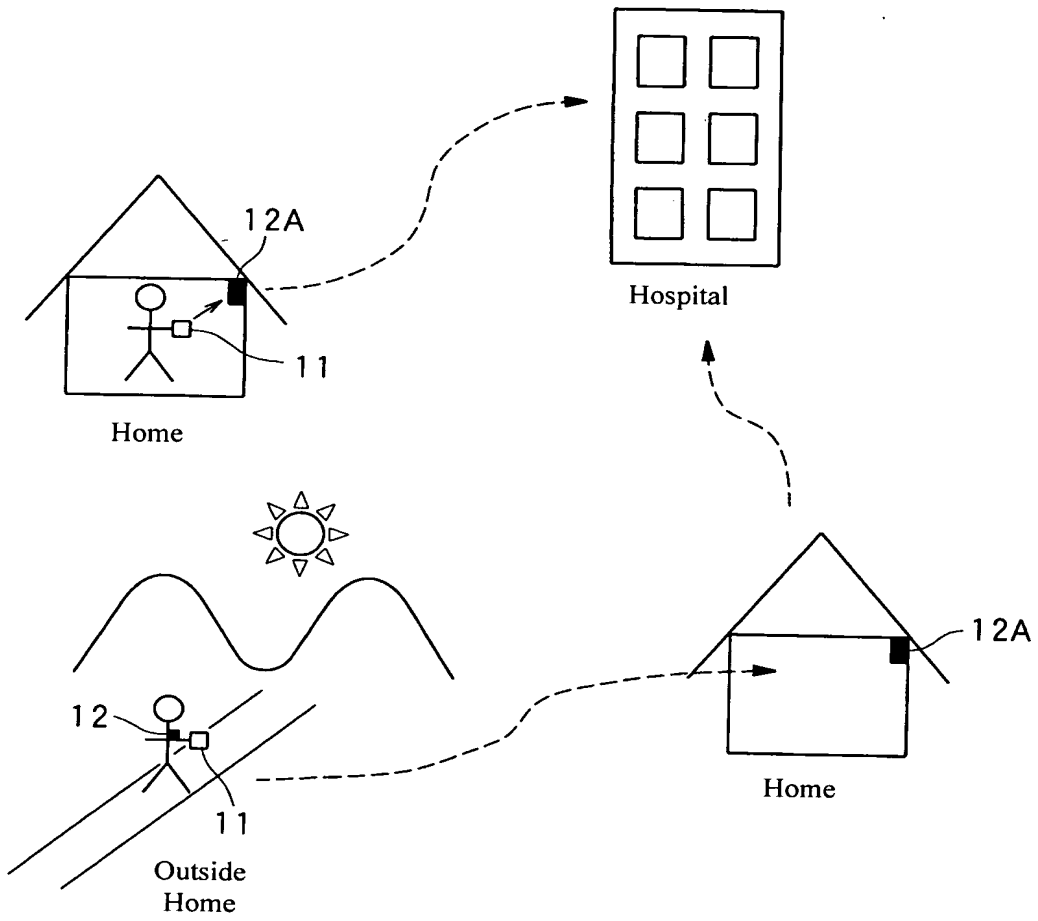

Fig. 21

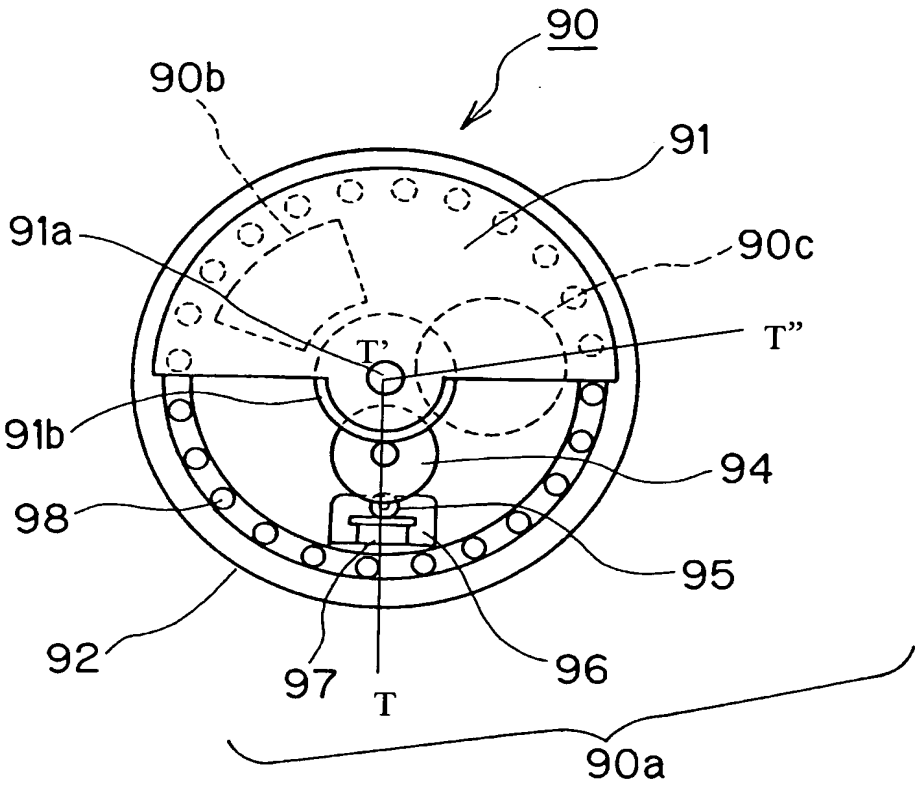

Fig. 22

T-T'-T" Cross-Section

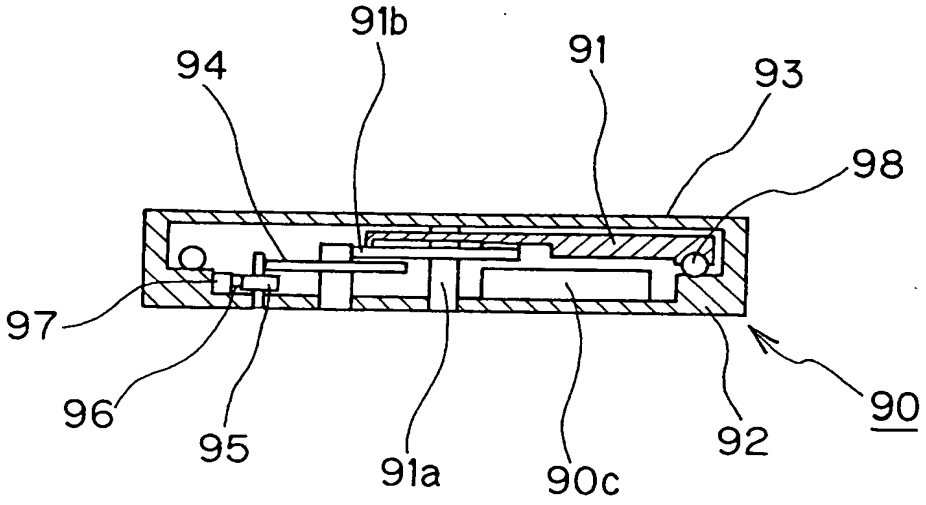

Fig. 23

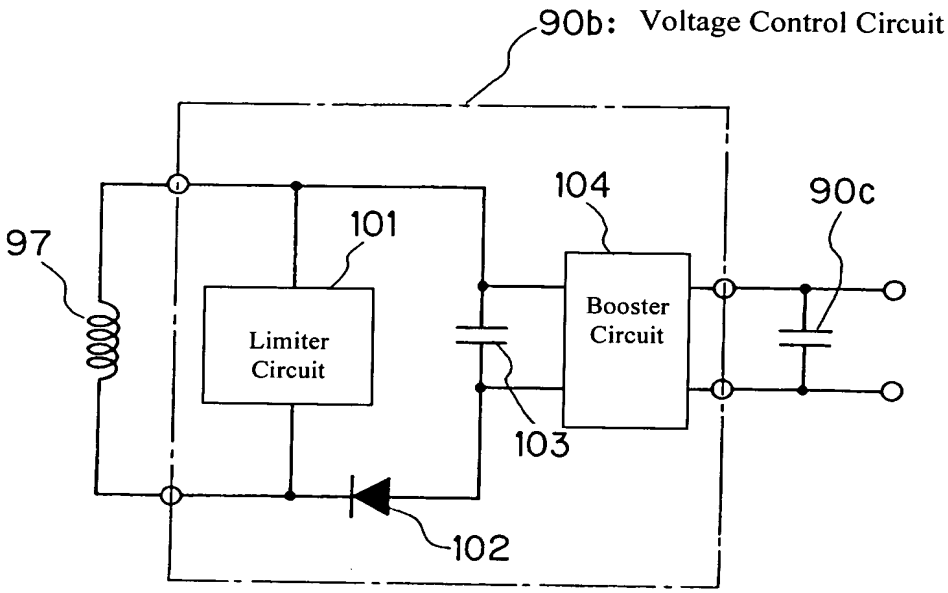
90b: Voltage Control Circuit
97
101
104
90c
Limiter Circuit
Booster Circuit
103
102

Fig. 24

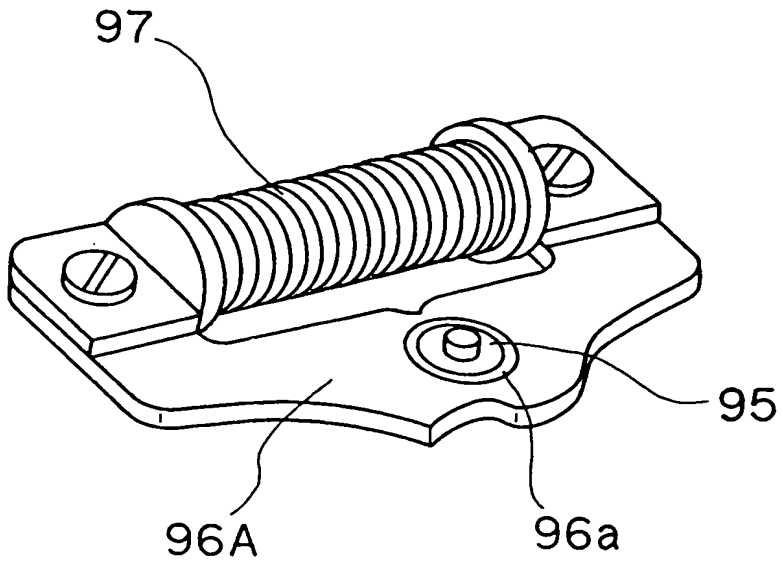

Fig. 25

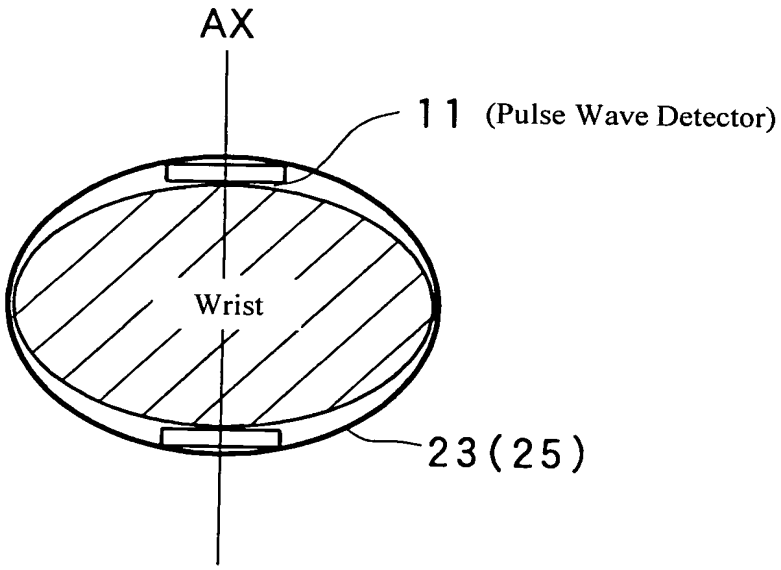

Fig. 26